



Lowell Regional Wastewater
451 First Street Boulevard
Lowell, MA 01854
Attn: Tom Kawa

4/24/2017

Dear Mr. Kawa,

Enclosed please find the toxicological evaluation and chemical analyses report for the effluent received on March 27, 2017. This is your 2017 Stormwater bioassay report. Please call me at (401) 353-3420 if you have any questions.

Sincerely,

Michael McCallum
Technical Laboratory Director

NEW ENGLAND TESTING LABORATORY, INC.

59 Greenhill St., West Warwick, RI 02893

(401) 353-3420

TOXICOLOGICAL EVALUATION
AND CHEMICAL ANALYSES
OF EFFLUENT:
NPDES Permit # MA0100633
Stormwater 2017 Sample

Prepared For:
Lowell Regional Wastewater
451 First Street Boulevard
Lowell, MA 01854

April 24, 2017

By
New England Testing Laboratory, Inc.
59 Greenhill Street
West Warwick, RI 02893

NETLAB CASE NUMBER: D0327-30



New England Bioassay

A Division of GZA



ACUTE AQUATIC TOXICITY TEST REPORT

**Lowell Regional Wastewater Utilities
Lowell, Massachusetts
NPDES Permit: MA0100633**

Test Start Date: 3/28/17

Test Period: March 2017

Report Prepared by:

New England Bioassay
A Division of GZA GeoEnvironmental, Inc.
77 Batson Drive
Manchester, CT 06042

NEB Project Number: 05.0044476.00

Report Date: April 21, 2017

Report Submitted to:

New England Testing Laboratories
59 Greenhill Street
West Warwick, RI02893

Sample ID: Stormwater

Please contact the Lab Manager, Kim Wills, at (860) 858-3153 or kimberly.wills@gza.com if you have any questions concerning these results.

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION
MANAGEMENT

77 Batson Drive
Manchester, CT 06042
T: 860.643.9560
F: 860.646.7169
www.nebio.com

Whole Effluent Toxicity Testing Report Instruction Form

Client Name/Project: NET/Lowell Test Date: 3/28/17

Sample ID: Stormwater

Your results were as follows:

☒ Pass

- ☐ Fail – Please proceed according to the instructions in your permit.
- ☐ Invalid – **Retesting is still required. Retest report will be sent at a later date under separate cover.**
- ☐ Original Test Invalid – **Valid retest performed. Both test and retest results are attached.**
- ☐ Retesting will be or has been performed according to the Case 1 Protocols outlined in the attached copy of EPA-New England's species-specific, self-implementing policy for alternate dilution water.
- ☐ This is your _____ case of dilution water toxicity. Please proceed according to the Case 2 Protocols outlined in the attached copy of EPA-New England's species-specific, self-implementing policy for alternate dilution water. The alternate dilution water you select for future tests for this species should be described as follows: "synthetic laboratory water made up according to EPA's toxicity test protocols, by adding specified amounts of salts into deionized water in order to match the hardness of our receiving water." Writing this letter should help you to avoid retests in the future.
- ☐ Available information is insufficient to determine whether this test passed or failed. Please compare results to your permit limits. Please submit a current copy of your permit to the NEB Lab so that we can determine the status of future tests results and help ensure your compliance with permit requirements.

Please complete the items on this list before reporting these results according to the instructions in the "Monitoring and Reporting" Section of your permit.

- Please complete, sign and date the upper portion of the "Whole Effluent Toxicity Test Report Certification" page which is the page directly following this page.
- Fill in the Sample Type and Sample Method (upper right) and the Permit Limits (lower left) on the New England Bioassay, Inc.-EPA Toxicity Test Summary Sheet(s) if they are incomplete.
- Fill in any missing information on the NEB Chain-of-Custody documents. This includes ensuring that the following information is recorded: Sampler's name and title, Facility name and address, Sample collection methods, Sample collection start and end dates and times, Types of sample, Chlorination status of samples upon shipment to NEB, Site description and Sample collection procedures.
- Monitoring results should be summarized on your monthly Discharge Monitoring Report Form.
- Signed and dated originals of this report must be submitted to the State (and Federal) Agencies specified in the "Monitoring and Reporting" section of your permit.

Questions? Please contact the Lab Manager, Kim Wills, at (860) 643-9560 or kimberly.wills@gza.com.

WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION (Permittee)

I certify under penalty of law that this document and all ATTACHMENTS were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on _____

[Date]

[Authorized Signature]

[Print or Type Name and Title]

[Print or Type the Permittee's Name]

[Print or Type the NPDES Permit No.]

Since the WET test and report check is complicated, the New England Bioassay Aquatic Toxicity Laboratory has certified the validity of the WET test data in the section below. Please note that this does not relieve the permittee from its responsibility to sign and certify the report under 40 C.F.R. S 122.41(k).

WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION (Bioassay Laboratory)

I certify under penalty of law that this document and all ATTACHMENTS were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on _____

[Date]

[Authorized Signature]

Kim Wills, Laboratory Manager

[Print or Type Name and Title]

New England Bioassay

[Print or Type Name of Bioassay Laboratory]

24. Telephone Contacts

If you have questions, please contact Joy Hilton, Water Technical Unit, at (617) 918-1877 or David McDonald, Ecosystem Assessment Unit, at (617) 918-8609.

NEW ENGLAND BIOASSAY, A DIVISION OF GZA EPA TEST SUMMARY SHEET

Facility Name: Lowell RWWU Test Start Date: 3/28/17
 NPDES Permit Number: MA0100633 Outfall Number: _____

<u>Test Type</u>	<u>Test Species</u>	<u>Sample Type</u>	<u>Sample Method</u>
<input checked="" type="checkbox"/> Acute	<input type="checkbox"/> Fathead Minnow	<input type="checkbox"/> Prechlorinated	<input checked="" type="checkbox"/> Grab
<input type="checkbox"/> Chronic	<input checked="" type="checkbox"/> Ceriodaphnia	<input checked="" type="checkbox"/> Dechlorinated	<input type="checkbox"/> Composite
<input type="checkbox"/> Modified	<input type="checkbox"/> Daphnia Pulex	<input type="checkbox"/> Chlorine Spiked in Lab	<input type="checkbox"/> Flowthru
<input type="checkbox"/> (chronic reporting	<input type="checkbox"/> Mysid Shrimp	<input type="checkbox"/> Chlorinated on site	<input type="checkbox"/> Other
<input type="checkbox"/> acute values)	<input type="checkbox"/> Sheepshead	<input type="checkbox"/> Unchlorinated	
<input type="checkbox"/> 24hr screening	<input type="checkbox"/> Menidia		
	<input type="checkbox"/> Sea Urchin		
	<input type="checkbox"/> Champia		
	<input type="checkbox"/> Selenastrum		

Dilution Water

- ☐ receiving water collected at a point upstream of or away from the discharge, free from toxicity or other sources of contamination; (Receiving water name: _____)
- ☐ alternate surface water of known quality and a hardness, etc. to generally reflect the characteristics of the receiving water; (Surface water name: _____)
- ☒ synthetic water prepared using either Millipore Mill-Q or equivalent deionized water and reagent grade chemicals; or deionized water combined with mineral water;
- ☐ or artificial sea salts mixed with deionized water;
- ☐ deionized water and hypersaline brine; or
- ☐ other _____

Effluent sampling date (s): 3/27/17

Effluent concentrations tested (in%): 0 6.25 12.5 25 50 100

* Permit limit concentration: ≥ 100%

Was effluent salinity adjusted? No If yes, to what value? N/A ppt

With sea salts? N/A Hypersaline brine solution? N/A

Actual effluent concentrations tested after salinity adjustment (%): 0 6.25 12.5 25 50 100

Reference Toxicant test date: 3/1/17

Test Acceptability Criteria

Mean Control Survival: <u>N/A</u>	Mean Control Reproduction: <u>N/A</u>
Mean Diluent Survival: <u>100%</u>	Mean Diluent Reproduction: <u>N/A</u>
Mean Control Weight: <u>N/A</u>	Mean Control Cell Count: <u>N/A</u>
Mean Diluent Weight: <u>N/A</u>	Mean Diluent Cell Count: <u>N/A</u>

	<u>Limits</u>		<u>Results</u>
LC50	<u>≥ 100%</u>	LC50	<u>> 100%</u>
		Upper Value	<u>±∞</u>
		Lower Value	<u>100%</u>
		Data Analysis	
		Method Used	<u>Graphical</u>
A-NOEC	<u>N/A</u>	A-NOEC	<u>100%</u>
C-NOEC	<u>N/A</u>	C-NOEC	<u>-----</u>
		LOEC	<u>-----</u>
IC25	<u>N/A</u>	IC25	<u>-----</u>
IC50	<u>N/A</u>	IC50	<u>-----</u>

CERIODAPHNIA DUBIA AQUATIC TOXICITY TEST REPORT

Test Reference Manual: EPA 821-R-02-012, "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater Organisms and Marine Organisms", Fifth Edition

Test Method: *Ceriodaphnia dubia* Acute Toxicity Test – Method 2002.0

Test Type: Acute Static Non-Renewal Freshwater Test

Temperature : 25 ± 1°C

Light Quality: Ambient Laboratory Illumination

Photoperiod: 16 hours light, 8 hours dark

Test Chamber Size: 30 mL

Test Solution Volume: Minimum 25 mL

Age of Test Organisms: 1-24 hours (neonates)

Number of Daphnids Per Test Chamber: 5

Number of Replicate Test Chambers Per Treatment: 4

Total Number of Daphnids Per Test Concentration: 20

Feeding Regime: Fed YCT and *Selanastrum* while holding prior to initiating test as per manual.

Aeration: None

Dilution Water: NEB Lab Synthetic Soft Water (hardness 40 to 48 mg/L)

Effluent Concentrations: 0%, 6.25%, 12.5%, 25%, 50% and 100% effluent

Test Duration: 48 hours

Effect measured: Mortality – no movement of body/appendages on gentle prodding.

Test Acceptability: ≥ 90% survival of test organisms in control solution Yes X No

Sampling Requirements: Samples first used within 36 hours of collection Yes X No

Sample Volume Required: Minimum 1 liter

Test Organism Source: NEB

Test Acceptability Criteria: Mean Alternate Water Control Survival = N/A
Mean Dilution Water Control Survival = 100%

<u>Test Results:</u>	<u>Limits</u>	<u>Results</u>	<u>Status</u>
48-hour LC50	≥ 100%	<u>>100%</u>	Pass <u>X</u> Fail <u> </u>
Upper Value		<u>±∞</u>	
Lower Value		<u>100%</u>	
Data Analysis Method Used		<u>Graphical</u>	
A-NOEC		<u>100%</u>	

Dechlorination Procedures: Chlorine is measured using 4500 CL-G DPD Colorimetric Method.

Sample was dechlorinated by adding sodium thiosulfate to the sample prior to test initiation. Since dechlorination of the effluent was necessary, a thiosulfate control of diluent water spiked with sodium thiosulfate was also included in the test series. Chlorine was _____ mg/L in a dechlorinated sample.

Total Residual Chlorine was re-measured following aeration, and was found to be _____ mg/L.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

NEW ENGLAND BIOASSAY ACUTE TOXICITY DATA FORM

COVER SHEET FOR LC50 TESTS

CLIENT: New England Testing Laboratory
 ADDRESS: 59 Greenhill Street
West Warwick, RI 02893
 SAMPLE TYPE: Lowell RWU Stormwater
 DILUTION WATER: Soft Reconstituted Freshwater

C. dubia TEST ID # 17-413
 COC # c37-1692
 PROJECT # 05.0044476.00

Sample Date(s): 3/27/17 Date Received: 3/27/17

INVERTEBRATES

TEST SET UP (TECH INIT) CW
 TEST SPECIES *Ceriodaphnia dubia*
 NEB LOT# Cd17(3-28)
 AGE < 24 hours
 TEST SOLUTION VOLUME (mls) 30
 NO. ORGANISMS PER TEST CHAMBER 5
 NO. ORGANISMS PER CONCENTRATION 20
 NO. ORGANISMS PER CONTROL 20

LABORATORY CONTROL WATER:

Hardness mg/L CaCO₃ Alkalinity mg/L CaCO₃

ARTIFICIAL FW:

NEB BATCH #

C37-S005	48	30
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DATE

TIME

TEST START:

3/28/17

1205

TEST END:

3/30/17

1105

RESULTS OF *Ceriodaphnia dubia* LC50 TEST

METHOD

LC50 (%)

95% Confidence
Limits

BINOMIAL/GRAPHICAL

>100%

100%±∞

PROBIT

SPEARMAN KARBUR

NOAEL

100%

NOEC: NO OBSERVABLE EFFECT CONCENTRATION

Comments:

REVIEWD BY:

DATE:

**NEW ENGLAND BIOASSAY
Toxicity Test Data Sheet**

NEB Test #: 17-413

Project #: 05.0044476.00

Facility Name: Lowell RWU Stormwater

Date Sampled: 3/27/17

Date Received: 3/27/17

Sample ID: Stormwater

Test Organism: Ceriodaphnia dubia

Organism Age: < 24 hours

Test Duration: 48 (hours)

Beginning Date: 3/28/17 Time: 1205

Dilution Water Source: SRCF

Dilution Hardness: 48 ppm as CaCO₃

Effluent Conc. %	Number of Surviving Organisms			Dissolved Oxygen (mg/L)			Temperature (°C)			pH		
	CW	CB	KO	CW	CB	KO	CW	CB	KO	CW	CB	KO
Initials	0	24	48	0	24	48	0	24	48	0	24	48
Diluent A	5	5	5	7.1	8.1	8.5	24.6	25.5	24.0	7.2	7.6	7.5
Diluent B	5	5	5			8.5			24.2			7.5
Diluent C	5	5	5			8.4			24.3			7.6
Diluent D	5	5	5			8.4			24.5			7.6
6.25 A	5	5	5	7.1	7.9	8.4	24.3	25.7	24.5	7.4	7.5	7.5
6.25 B	5	5	5			8.4			24.5			7.6
6.25 C	5	5	5			8.4			24.6			7.6
6.25 D	5	5	5			8.3			24.6			7.6
12.5 A	5	5	5	7.1	7.8	8.3	24.2	25.6	24.6	7.5	7.6	7.6
12.5 B	5	5	5			8.3			24.6			7.6
12.5 C	5	5	5			8.3			24.7			7.7
12.5 D	5	5	5			8.2			24.8			7.7
25 A	5	5	5	7.1	7.6	8.2	24.5	25.7	24.8	7.6	7.6	7.7
25 B	5	5	5			8.2			24.7			7.7
25 C	5	5	5			8.1			24.7			7.7
25 D	5	5	5			8.1			24.7			7.8
50 A	5	5	5	6.9	7.1	8.1	24.4	25.8	24.7	7.5	7.7	7.8
50 B	5	5	5			7.9			24.7			7.8
50 C	5	5	5			7.9			24.7			7.8
50 D	5	5	5			7.9			24.7			7.9

LC50	Confidence Interval	A-NOEC	Computational Method
>100%	100%±∞	100%	Graphical

NEB Test #:	17-413
Project #:	05.0044476.00
Facility Name:	Lowell RWU Stormwater
Date Sampled:	3/27/17
Date Received:	3/27/17
Sample ID:	Stormwater

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CETIS Analytical Report

Report Date: 21 Apr-17 11:06 (p 1 of 2)
 Test Code: 17-413 | 09-6938-3753

Ceriodaphnia 48-h Acute Survival Test

New England Bioassay

Analysis ID:	12-7868-6810	Endpoint:	48h Survival Rate	CETIS Version:	CETISv1.9.2
Analyzed:	21 Apr-17 11:06	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes
Batch ID:	11-9877-1193	Test Type:	Survival (48h)	Analyst:	
Start Date:	28 Mar-17 12:05	Protocol:	EPA/821/R-02-012 (2002)	Diluent:	Laboratory Water
Ending Date:	30 Mar-17 11:05	Species:	Ceriodaphnia dubia	Brine:	Not Applicable
Duration:	47h	Source:	In-House Culture	Age:	<24h
Sample ID:	11-2351-3758	Code:	42F7759E	Client:	New England Testing Labs
Sample Date:	27 Mar-17 11:00	Material:	WWTF Effluent	Project:	
Receipt Date:	27 Mar-17 16:15	Source:	Lowell RWWU (MA0100633)		
Sample Age:	25h	Station:			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X)	Linear	938231	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	1	0.9	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
LC50	>100	n/a	n/a	<1	n/a	n/a

48h Survival Rate Summary

Calculated Variate(A/B)

Conc-%	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	D	4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
6.25		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
12.5		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
25		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
50		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
100		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20

48h Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

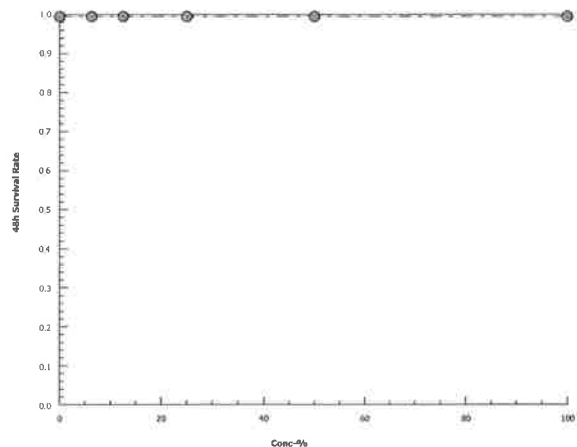
48h Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

Ceriodaphnia 48-h Acute Survival Test New England Bioassay

Analysis ID:	12-7868-6810	Endpoint:	48h Survival Rate	CETIS Version:	CETISv1.9.2
Analyzed:	21 Apr-17 11:06	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Graphics



CETIS Analytical Report

Report Date: 21 Apr-17 11:06 (p 1 of 2)
Test Code: 17-413 | 09-6938-3753

Ceriodaphnia 48-h Acute Survival Test

New England Bioassay

Analysis ID: 15-0851-5314	Endpoint: 48h Survival Rate	CETIS Version: CETISv1.9.2
Analyzed: 21 Apr-17 11:06	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 11-9877-1193	Test Type: Survival (48h)	Analyst:
Start Date: 28 Mar-17 12:05	Protocol: EPA/821/R-02-012 (2002)	Diluent: Laboratory Water
Ending Date: 30 Mar-17 11:05	Species: Ceriodaphnia dubia	Brine: Not Applicable
Duration: 47h	Source: In-House Culture	Age: <24h
Sample ID: 11-2351-3758	Code: 42F7759E	Client: New England Testing Labs
Sample Date: 27 Mar-17 11:00	Material: WWTF Effluent	Project:
Receipt Date: 27 Mar-17 16:15	Source: Lowell RWWU (MA0100633)	
Sample Age: 25h	Station:	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Angular (Corrected)	C > T	100	> 100	n/a	1

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		6.25	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		12.5	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		25	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		50	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		100	18	10	1	6	Asymp	0.8333	Non-Significant Effect

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	1	0.9	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	5	65540	<1.0E-37	Significant Effect
Error	0	0	18			
Total	0		23			

48h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
6.25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
12.5		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
50		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
100		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
6.25		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
12.5		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
25		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
50		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
100		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%

CETIS Analytical Report

Report Date: 21 Apr-17 11:06 (p 2 of 2)
Test Code: 17-413 | 09-6938-3753

Ceriodaphnia 48-h Acute Survival Test

New England Bioassay

Analysis ID: 15-0851-5314
Analyzed: 21 Apr-17 11:06

Endpoint: 48h Survival Rate
Analysis: Nonparametric-Control vs Treatments

CETIS Version: CETISv1.9.2
Official Results: Yes

48h Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

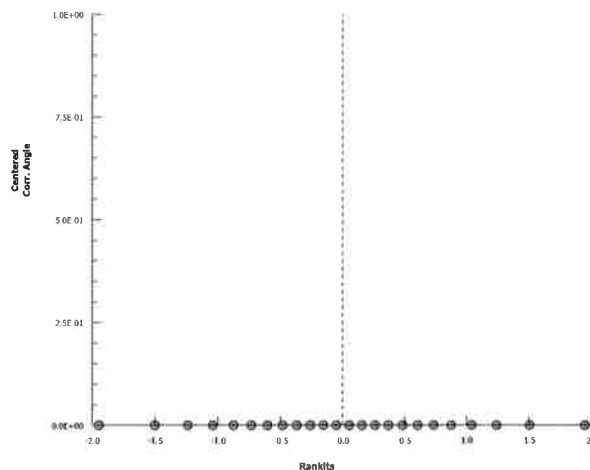
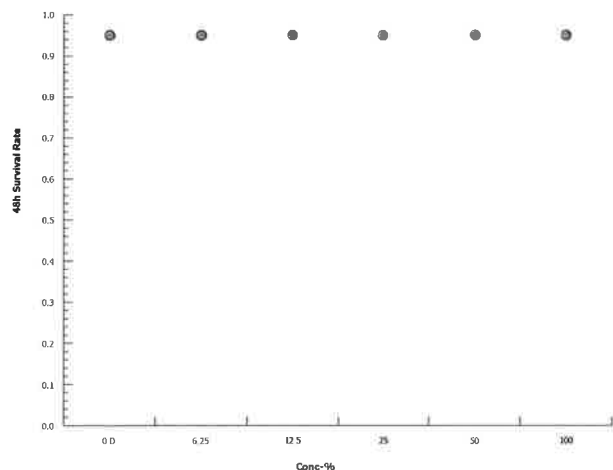
Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.345	1.345	1.345	1.345
6.25		1.345	1.345	1.345	1.345
12.5		1.345	1.345	1.345	1.345
25		1.345	1.345	1.345	1.345
50		1.345	1.345	1.345	1.345
100		1.345	1.345	1.345	1.345

48h Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

Graphics



INITIAL CHEMISTRY INFORMATION

CLIENT:
PROJECT #

Lowell Stormwater
05.0044476.00

RECIPT DATE	3/28/17
SAMPLE	Effluent
COC #	KO
Temperature (°C)	4.1
Dissolved Oxygen (mg/L)	7.9
pH (standard units)	7.0
Conductivity (µmhos/cm)	1,487
Salinity (ppt)	<1
Hardness (as mg/L CaCO ₃)	104
Alkalinity (as mg/L CaCO ₃)	105
TRC - DPD (mg/L)	0.005
INITIALS	KO

Additional notes:

ANALYTICAL RESULTS

Case No. D0327-30

<u>Parameter</u>	<u>Effluent, mg/L</u>	<u>Det. Limit</u>
Total Solids	664	10
Total Dissolved Solids	644	10
Total Suspended Solids	20	2
Ammonia (N)	15.4	0.1
Total Organic Carbon	8.70	1.0
TKN	25.74	0.1
Nitrate & Nitrite	2.38	0.007
Total Phosphorus	1.72	0.02
Hardness	135.6	0.33
<u>Parameter</u>	<u>Effluent, mg/L</u>	<u>Det. Limit</u>
Cadmium	0.0001	0.0001
Lead	0.0006	0.0002
Copper	0.011	0.003
Zinc	0.086	0.005
Nickel	0.003	0.001
Aluminum	0.159	0.013
Magnesium	5.16	0.013
Calcium	45.8	0.013
N.D.= Not Detected		

**NEW ENGLAND BIOASSAY
CHAIN-OF-CUSTODY**

EFFLUENT

Sampler: JIN BOE MCGOWAN
 Title: CHEMIST
 Facility: Lowell Regional Wastewater Utility
 Address: First Street Blvd. Route 110
Lowell, MA 01850

RECEIVING WATER

Sampler: _____
 Title: _____
 Facility: Lowell Regional Wastewater Utility
 Address: First Street Blvd. Route 110
Lowell, MA 01850

Sample Information

Collection Method: ☒ Grab
 _____ Composite
 Sample ID: _____
 Start & End Dates: 3-27-2017 11:00 AM
 Start & End Times: _____

037-1692

Type of Sample: ☒ WWTF Effluent
 _____ Industrial Effluent
 _____ Other _____
 Is the sample: _____ Prechlorinated
☒ Dechlorinated
 _____ Chlorine spiked in lab
 _____ Unchlorinated

Site Description: _____

Sample Collection Procedures: _____

Sample Shipment

Method of Shipment: UPS
 Relinquished By: [Signature] Date: 3-27-17 Time: 11:40 AM
 Received By: [Signature] Date: 3-27-17 Time: 11:40
 Relinquished By: [Signature] Date: 3-27-17 Time: 1430
 Received By: [Signature] Date: 3-27-17 Time: 1:30
RC [Signature] Date: 3-27-17 Time: 3:30

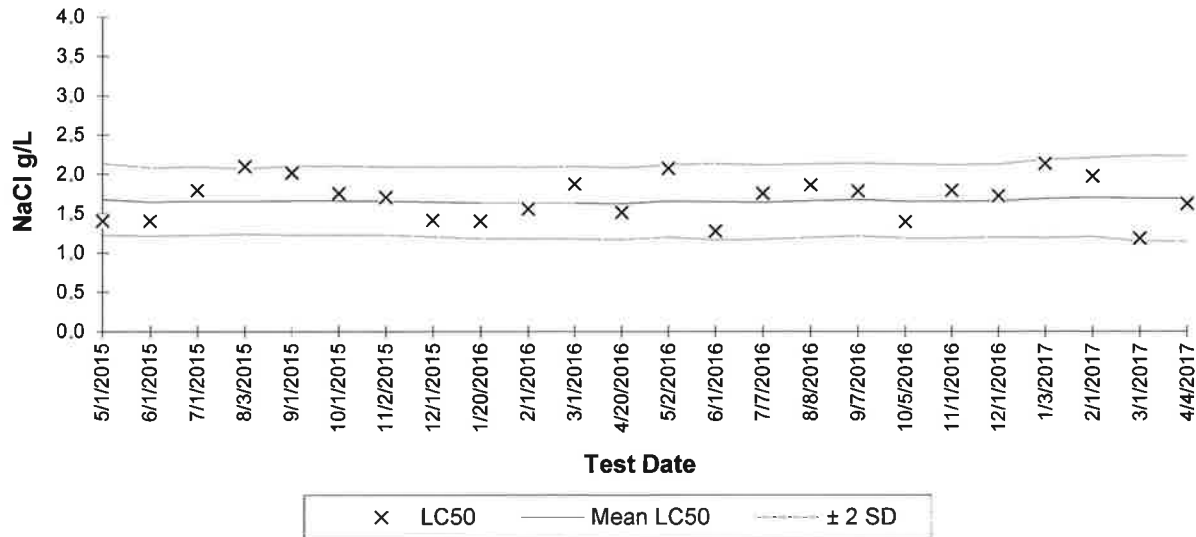
FOR NEB USE ONLY

Temperature of Effluent Upon Receipt at Lab: RCO [Signature] 3-27-17 1615 °C
 Effluent COC# _____
 received by (NEB): [Signature] 3/27/17 1615
 received ON 105

**IF THIS COOLER IS MISPLACED OR THE LABEL IS LOST, PLEASE SHIP TO:
 KIM WILLS, NEW ENGLAND BIOASSAY, 77 BATSON DRIVE, MANCHESTER CT 06042**

New England Bioassay
Reference Toxicant Data: *Ceriodaphnia dubia* 48-hour LC50

Reference Toxicant: Sodium chloride
Testing Dates: May 2015 - April 2017



Test ID	Date	LC ₅₀	Mean LC ₅₀	STD	-2 STD	+2 STD	CV	CV National	CV National
								75th %	90th %
15-545	5/1/2015	1.4	1.7	0.2	1.2	2.1	0.14	0.29	0.34
15-700	6/1/2015	1.4	1.6	0.2	1.2	2.1	0.13	0.29	0.34
15-896	7/1/2015	1.8	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1078	8/3/2015	2.1	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1293	9/1/2015	2.0	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1453	10/1/2015	1.8	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1684	11/2/2015	1.7	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1772	12/1/2015	1.4	1.6	0.2	1.2	2.1	0.13	0.29	0.34
16-107	1/20/2016	1.4	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-134	2/1/2016	1.6	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-298	3/1/2016	1.9	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-563	4/20/2016	1.5	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-592	5/2/2016	2.1	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-703	6/1/2016	1.3	1.7	0.2	1.2	2.1	0.15	0.29	0.34
16-885	7/7/2016	1.8	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-1156	8/8/2016	1.9	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1252	9/7/2016	1.8	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1466	10/5/2016	1.4	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1586	11/1/2016	1.8	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1730	12/1/2016	1.7	1.7	0.2	1.2	2.1	0.14	0.29	0.34
17-5	1/3/2017	2.1	1.7	0.2	1.2	2.2	0.15	0.29	0.34
17-147	2/1/2017	2.0	1.7	0.3	1.2	2.2	0.15	0.29	0.34
17-274	3/1/2017	1.2	1.7	0.3	1.2	2.2	0.16	0.29	0.34
17-475	4/4/2017	1.6	1.7	0.3	1.1	2.2	0.16	0.29	0.34



New England Bioassay

A Division of GZA



ACUTE AQUATIC TOXICITY TEST REPORT

**Lowell Regional Wastewater Utilities
Lowell, Massachusetts
NPDES Permit: MA0100633**

Test Start Date: 3/28/17

Test Period: March 2017

Report Prepared by:

New England Bioassay
A Division of GZA GeoEnvironmental, Inc.
77 Batson Drive
Manchester, CT 06042

NEB Project Number: 05.0044476.00

Report Date: April 21, 2017

Report Submitted to:

New England Testing Laboratories
59 Greenhill Street
West Warwick, RI02893

Sample ID: Stormwater

Please contact the Lab Manager, Kim Wills, at (860) 858-3153 or kimberly.wills@gza.com if you have any questions concerning these results.

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION
MANAGEMENT

77 Batson Drive
Manchester, CT 06042
T: 860.643.9560
F: 860.646.7169
www.nebio.com

Whole Effluent Toxicity Testing Report Instruction Form

Client Name/Project: NET/Lowell Test Date: 3/28/17

Sample ID: Stormwater

Your results were as follows:

☒ Pass

- ☐ Fail – Please proceed according to the instructions in your permit.
- ☐ Invalid – **Retesting is still required. Retest report will be sent at a later date under separate cover.**
- ☐ Original Test Invalid – **Valid retest performed. Both test and retest results are attached.**
- ☐ Retesting will be or has been performed according to the Case 1 Protocols outlined in the attached copy of EPA-New England's species-specific, self-implementing policy for alternate dilution water.
- ☐ This is your _____ case of dilution water toxicity. Please proceed according to the Case 2 Protocols outlined in the attached copy of EPA-New England's species-specific, self-implementing policy for alternate dilution water. The alternate dilution water you select for future tests for this species should be described as follows: "synthetic laboratory water made up according to EPA's toxicity test protocols, by adding specified amounts of salts into deionized water in order to match the hardness of our receiving water." Writing this letter should help you to avoid retests in the future.
- ☐ Available information is insufficient to determine whether this test passed or failed. Please compare results to your permit limits. Please submit a current copy of your permit to the NEB Lab so that we can determine the status of future tests results and help ensure your compliance with permit requirements.

Please complete the items on this list before reporting these results according to the instructions in the "Monitoring and Reporting" Section of your permit.

- Please complete, sign and date the upper portion of the "Whole Effluent Toxicity Test Report Certification" page which is the page directly following this page.
- Fill in the Sample Type and Sample Method (upper right) and the Permit Limits (lower left) on the New England Bioassay, Inc.-EPA Toxicity Test Summary Sheet(s) if they are incomplete.
- Fill in any missing information on the NEB Chain-of-Custody documents. This includes ensuring that the following information is recorded: Sampler's name and title, Facility name and address, Sample collection methods, Sample collection start and end dates and times, Types of sample, Chlorination status of samples upon shipment to NEB, Site description and Sample collection procedures.
- Monitoring results should be summarized on your monthly Discharge Monitoring Report Form.
- Signed and dated originals of this report must be submitted to the State (and Federal) Agencies specified in the "Monitoring and Reporting" section of your permit.

Questions? Please contact the Lab Manager, Kim Wills, at (860) 643-9560 or kimberly.wills@gza.com.

WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION (Permittee)

I certify under penalty of law that this document and all ATTACHMENTS were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on _____

[Date]

[Authorized Signature]

[Print or Type Name and Title]

[Print or Type the Permittee's Name]

[Print or Type the NPDES Permit No.]

Since the WET test and report check is complicated, the New England Bioassay Aquatic Toxicity Laboratory has certified the validity of the WET test data in the section below. Please note that this does not relieve the permittee from its responsibility to sign and certify the report under 40 C.F.R. S 122.41(k).

WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION (Bioassay Laboratory)

I certify under penalty of law that this document and all ATTACHMENTS were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on _____

[Date]

[Authorized Signature]

Kim Wills, Laboratory Manager

[Print or Type Name and Title]

New England Bioassay

[Print or Type Name of Bioassay Laboratory]

24. Telephone Contacts

If you have questions, please contact Joy Hilton, Water Technical Unit, at (617) 918-1877 or David McDonald, Ecosystem Assessment Unit, at (617) 918-8609.

NEW ENGLAND BIOASSAY, A DIVISION OF GZA EPA TEST SUMMARY SHEET

Facility Name: Lowell RWWU Test Start Date: 3/28/17
 NPDES Permit Number: MA0100633 Outfall Number: _____

<u>Test Type</u>	<u>Test Species</u>	<u>Sample Type</u>	<u>Sample Method</u>
<input checked="" type="checkbox"/> Acute	<input type="checkbox"/> Fathead Minnow	<input type="checkbox"/> Prechlorinated	<input checked="" type="checkbox"/> Grab
<input type="checkbox"/> Chronic	<input checked="" type="checkbox"/> Ceriodaphnia	<input checked="" type="checkbox"/> Dechlorinated	<input type="checkbox"/> Composite
<input type="checkbox"/> Modified	<input type="checkbox"/> Daphnia Pulex	<input type="checkbox"/> Chlorine Spiked in Lab	<input type="checkbox"/> Flowthru
<input type="checkbox"/> (chronic reporting	<input type="checkbox"/> Mysid Shrimp	<input type="checkbox"/> Chlorinated on site	<input type="checkbox"/> Other
<input type="checkbox"/> acute values)	<input type="checkbox"/> Sheepshead	<input type="checkbox"/> Unchlorinated	
<input type="checkbox"/> 24hr screening	<input type="checkbox"/> Menidia		
	<input type="checkbox"/> Sea Urchin		
	<input type="checkbox"/> Champia		
	<input type="checkbox"/> Selenastrum		

Dilution Water

- ☐ receiving water collected at a point upstream of or away from the discharge, free from toxicity or other sources of contamination; (Receiving water name: _____)
- ☐ alternate surface water of known quality and a hardness, etc. to generally reflect the characteristics of the receiving water; (Surface water name: _____)
- ☒ synthetic water prepared using either Millipore Mill-Q or equivalent deionized water and reagent grade chemicals; or deionized water combined with mineral water;
- ☐ or artificial sea salts mixed with deionized water;
- ☐ deionized water and hypersaline brine; or
- ☐ other _____

Effluent sampling date (s): 3/27/17

Effluent concentrations tested (in%): 0 6.25 12.5 25 50 100

* Permit limit concentration: ≥ 100%

Was effluent salinity adjusted? No If yes, to what value? N/A ppt

With sea salts? N/A Hypersaline brine solution? N/A

Actual effluent concentrations tested after salinity adjustment (%): 0 6.25 12.5 25 50 100

Reference Toxicant test date: 3/1/17

Test Acceptability Criteria

Mean Control Survival: <u>N/A</u>	Mean Control Reproduction: <u>N/A</u>
Mean Diluent Survival: <u>100%</u>	Mean Diluent Reproduction: <u>N/A</u>
Mean Control Weight: <u>N/A</u>	Mean Control Cell Count: <u>N/A</u>
Mean Diluent Weight: <u>N/A</u>	Mean Diluent Cell Count: <u>N/A</u>

	<u>Limits</u>		<u>Results</u>
LC50	<u>≥ 100%</u>	LC50	<u>> 100%</u>
		Upper Value	<u>±∞</u>
		Lower Value	<u>100%</u>
		Data Analysis	
		Method Used	<u>Graphical</u>
A-NOEC	<u>N/A</u>	A-NOEC	<u>100%</u>
C-NOEC	<u>N/A</u>	C-NOEC	<u>-----</u>
		LOEC	<u>-----</u>
IC25	<u>N/A</u>	IC25	<u>-----</u>
IC50	<u>N/A</u>	IC50	<u>-----</u>

CERIODAPHNIA DUBIA AQUATIC TOXICITY TEST REPORT

Test Reference Manual: EPA 821-R-02-012, "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater Organisms and Marine Organisms", Fifth Edition

Test Method: *Ceriodaphnia dubia* Acute Toxicity Test – Method 2002.0

Test Type: Acute Static Non-Renewal Freshwater Test

Temperature : 25 ± 1°C

Light Quality: Ambient Laboratory Illumination

Photoperiod: 16 hours light, 8 hours dark

Test Chamber Size: 30 mL

Test Solution Volume: Minimum 25 mL

Age of Test Organisms: 1-24 hours (neonates)

Number of Daphnids Per Test Chamber: 5

Number of Replicate Test Chambers Per Treatment: 4

Total Number of Daphnids Per Test Concentration: 20

Feeding Regime: Fed YCT and *Selanastrum* while holding prior to initiating test as per manual.

Aeration: None

Dilution Water: NEB Lab Synthetic Soft Water (hardness 40 to 48 mg/L)

Effluent Concentrations: 0%, 6.25%, 12.5%, 25%, 50% and 100% effluent

Test Duration: 48 hours

Effect measured: Mortality – no movement of body/appendages on gentle prodding.

Test Acceptability: ≥ 90% survival of test organisms in control solution Yes X No

Sampling Requirements: Samples first used within 36 hours of collection Yes X No

Sample Volume Required: Minimum 1 liter

Test Organism Source: NEB

Test Acceptability Criteria: Mean Alternate Water Control Survival = N/A
Mean Dilution Water Control Survival = 100%

<u>Test Results:</u>	<u>Limits</u>	<u>Results</u>	<u>Status</u>
48-hour LC50	≥ 100%	>100%	Pass <u>X</u> Fail <u> </u>
Upper Value		±∞	
Lower Value		100%	
Data Analysis Method Used		<u>Graphical</u>	
A-NOEC		100%	

Yes X No

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

NEW ENGLAND BIOASSAY ACUTE TOXICITY DATA FORM

COVER SHEET FOR LC50 TESTS

CLIENT: New England Testing Laboratory
 ADDRESS: 59 Greenhill Street
West Warwick, RI 02893
 SAMPLE TYPE: Lowell RWU Stormwater
 DILUTION WATER: Soft Reconstituted Freshwater

C. dubia TEST ID # 17-413
 COC # c37-1692
 PROJECT # 05.0044476.00

Sample Date(s): 3/27/17 Date Received: 3/27/17

INVERTEBRATES

TEST SET UP (TECH INIT) CW
 TEST SPECIES *Ceriodaphnia dubia*
 NEB LOT# Cd17(3-28)
 AGE < 24 hours
 TEST SOLUTION VOLUME (mls) 30
 NO. ORGANISMS PER TEST CHAMBER 5
 NO. ORGANISMS PER CONCENTRATION 20
 NO. ORGANISMS PER CONTROL 20

LABORATORY CONTROL WATER:

Hardness mg/L CaCO₃ Alkalinity mg/L CaCO₃

ARTIFICIAL FW:

NEB BATCH #

C37-S005	48	30
----------	----	----

DATE

TIME

TEST START:

3/28/17

1205

TEST END:

3/30/17

1105

RESULTS OF *Ceriodaphnia dubia* LC50 TEST

METHOD

LC50 (%)

95% Confidence
Limits

BINOMIAL/GRAPHICAL

>100%

100%±∞

PROBIT

SPEARMAN KARBUR

NOAEL

100%

NOEC: NO OBSERVABLE EFFECT CONCENTRATION

Comments:

REVIEWD BY:

DATE:

**NEW ENGLAND BIOASSAY
Toxicity Test Data Sheet**

NEB Test #: 17-413

Project #: 05.0044476.00

Facility Name: Lowell RWU Stormwater

Date Sampled: 3/27/17

Date Received: 3/27/17

Sample ID: Stormwater

Test Organism: Ceriodaphnia dubia

Organism Age: < 24 hours

Test Duration: 48 (hours)

Beginning Date: 3/28/17 Time: 1205

Dilution Water Source: SRCF

Dilution Hardness: 48 ppm as CaCO₃

Effluent Conc. %	Number of Surviving Organisms			Dissolved Oxygen (mg/L)			Temperature (°C)			pH		
	CW	CB	KO	CW	CB	KO	CW	CB	KO	CW	CB	KO
Initials	0	24	48	0	24	48	0	24	48	0	24	48
Diluent A	5	5	5	7.1	8.1	8.5	24.6	25.5	24.0	7.2	7.6	7.5
Diluent B	5	5	5			8.5			24.2			7.5
Diluent C	5	5	5			8.4			24.3			7.6
Diluent D	5	5	5			8.4			24.5			7.6
6.25 A	5	5	5	7.1	7.9	8.4	24.3	25.7	24.5	7.4	7.5	7.5
6.25 B	5	5	5			8.4			24.5			7.6
6.25 C	5	5	5			8.4			24.6			7.6
6.25 D	5	5	5			8.3			24.6			7.6
12.5 A	5	5	5	7.1	7.8	8.3	24.2	25.6	24.6	7.5	7.6	7.6
12.5 B	5	5	5			8.3			24.6			7.6
12.5 C	5	5	5			8.3			24.7			7.7
12.5 D	5	5	5			8.2			24.8			7.7
25 A	5	5	5	7.1	7.6	8.2	24.5	25.7	24.8	7.6	7.6	7.7
25 B	5	5	5			8.2			24.7			7.7
25 C	5	5	5			8.1			24.7			7.7
25 D	5	5	5			8.1			24.7			7.8
50 A	5	5	5	6.9	7.1	8.1	24.4	25.8	24.7	7.5	7.7	7.8
50 B	5	5	5			7.9			24.7			7.8
50 C	5	5	5			7.9			24.7			7.8
50 D	5	5	5			7.9			24.7			7.9

LC50	Confidence Interval	A-NOEC	Computational Method
>100%	100%±∞	100%	Graphical

Toxicity Test Data Sheet

17-413

Ceriodaphnia dubia

05.0044476.00

< 24 hours

Lowell RWU Stormwater

48 (hours)

3/27/17

Time: 1205

3/27/17

SRCF

Stormwater

48 ppm as CaCO_3

[illegible]

LC50	Confidence Interval	A-NOEC	Computational Method
>100%	100%±∞	100%	Graphical

CETIS Analytical Report

Report Date: 21 Apr-17 11:06 (p 1 of 2)
 Test Code: 17-413 | 09-6938-3753

Ceriodaphnia 48-h Acute Survival Test

New England Bioassay

Analysis ID:	12-7868-6810	Endpoint:	48h Survival Rate	CETIS Version:	CETISv1.9.2
Analyzed:	21 Apr-17 11:06	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes
Batch ID:	11-9877-1193	Test Type:	Survival (48h)	Analyst:	
Start Date:	28 Mar-17 12:05	Protocol:	EPA/821/R-02-012 (2002)	Diluent:	Laboratory Water
Ending Date:	30 Mar-17 11:05	Species:	Ceriodaphnia dubia	Brine:	Not Applicable
Duration:	47h	Source:	In-House Culture	Age:	<24h
Sample ID:	11-2351-3758	Code:	42F7759E	Client:	New England Testing Labs
Sample Date:	27 Mar-17 11:00	Material:	WWTF Effluent	Project:	
Receipt Date:	27 Mar-17 16:15	Source:	Lowell RWWU (MA0100633)		
Sample Age:	25h	Station:			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X)	Linear	938231	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	1	0.9	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
LC50	>100	n/a	n/a	<1	n/a	n/a

48h Survival Rate Summary

Calculated Variate(A/B)

Conc-%	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	D	4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
6.25		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
12.5		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
25		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
50		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
100		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20

48h Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

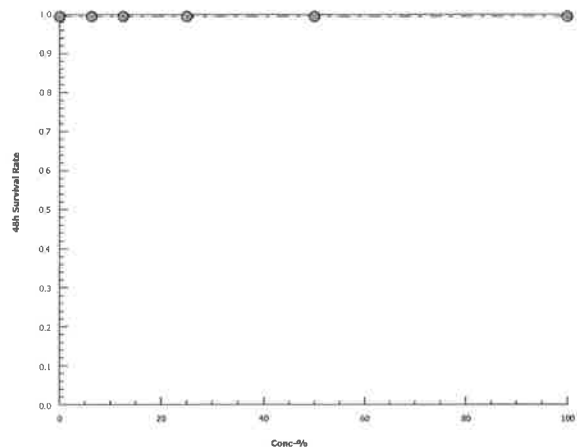
48h Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

Ceriodaphnia 48-h Acute Survival Test New England Bioassay

Analysis ID:	12-7868-6810	Endpoint:	48h Survival Rate	CETIS Version:	CETISv1.9.2
Analyzed:	21 Apr-17 11:06	Analysis:	Linear Interpolation (ICPIN)	Official Results:	Yes

Graphics



CETIS Analytical Report

Report Date: 21 Apr-17 11:06 (p 1 of 2)
Test Code: 17-413 | 09-6938-3753

Ceriodaphnia 48-h Acute Survival Test

New England Bioassay

Analysis ID: 15-0851-5314	Endpoint: 48h Survival Rate	CETIS Version: CETISv1.9.2
Analyzed: 21 Apr-17 11:06	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes
Batch ID: 11-9877-1193	Test Type: Survival (48h)	Analyst:
Start Date: 28 Mar-17 12:05	Protocol: EPA/821/R-02-012 (2002)	Diluent: Laboratory Water
Ending Date: 30 Mar-17 11:05	Species: Ceriodaphnia dubia	Brine: Not Applicable
Duration: 47h	Source: In-House Culture	Age: <24h
Sample ID: 11-2351-3758	Code: 42F7759E	Client: New England Testing Labs
Sample Date: 27 Mar-17 11:00	Material: WWTF Effluent	Project:
Receipt Date: 27 Mar-17 16:15	Source: Lowell RWWU (MA0100633)	
Sample Age: 25h	Station:	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Angular (Corrected)	C > T	100	> 100	n/a	1

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		6.25	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		12.5	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		25	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		50	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		100	18	10	1	6	Asymp	0.8333	Non-Significant Effect

Test Acceptability Criteria

TAC Limits

Attribute	Test Stat	Lower	Upper	Overlap	Decision
Control Resp	1	0.9	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	5	65540	<1.0E-37	Significant Effect
Error	0	0	18			
Total	0		23			

48h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
6.25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
12.5		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
50		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
100		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
6.25		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
12.5		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
25		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
50		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
100		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%

CETIS Analytical Report

Report Date: 21 Apr-17 11:06 (p 2 of 2)
Test Code: 17-413 | 09-6938-3753

Ceriodaphnia 48-h Acute Survival Test

New England Bioassay

Analysis ID: 15-0851-5314 Endpoint: 48h Survival Rate CETIS Version: CETISv1.9.2
Analyzed: 21 Apr-17 11:06 Analysis: Nonparametric-Control vs Treatments Official Results: Yes

48h Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

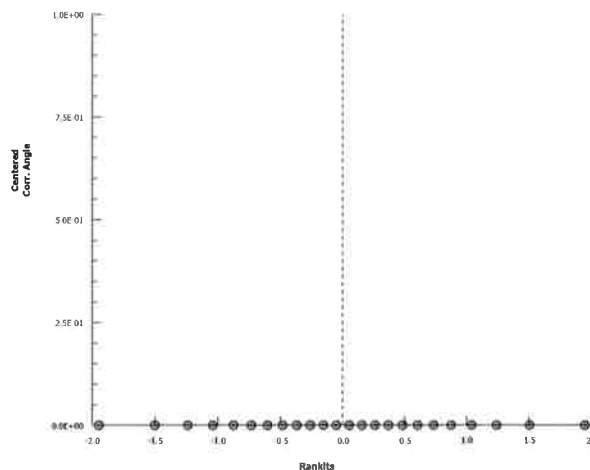
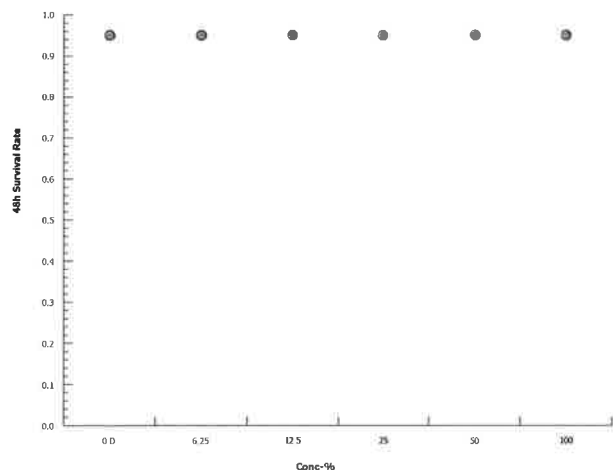
Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.345	1.345	1.345	1.345
6.25		1.345	1.345	1.345	1.345
12.5		1.345	1.345	1.345	1.345
25		1.345	1.345	1.345	1.345
50		1.345	1.345	1.345	1.345
100		1.345	1.345	1.345	1.345

48h Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

Graphics



INITIAL CHEMISTRY INFORMATION

CLIENT:
PROJECT #

Lowell Stormwater
05.0044476.00

RECIPT DATE	3/28/17
SAMPLE	Effluent
COC #	KO
Temperature (°C)	4.1
Dissolved Oxygen (mg/L)	7.9
pH (standard units)	7.0
Conductivity (µmhos/cm)	1,487
Salinity (ppt)	<1
Hardness (as mg/L CaCO ₃)	104
Alkalinity (as mg/L CaCO ₃)	105
TRC - DPD (mg/L)	0.005
INITIALS	KO

Additional notes:

NEW ENGLAND BIOASSAY
CHAIN-OF-CUSTODY

EFFLUENT

Sampler: JIN BOE MCGOWAN
Title: CHEMIST
Facility: Lowell Regional Wastewater Utility
Address: First Street Blvd. Route 110
Lowell, MA 01850

RECEIVING WATER

Sampler: _____
Title: _____
Facility: Lowell Regional Wastewater Utility
Address: First Street Blvd. Route 110
Lowell, MA 01850

Sample Information

Collection Method: ☒ Grab
☐ Composite

037-1692

Sample ID: _____

Start & End Dates: 3-27-2017 11:00 AM

Start & End Times: _____

Type of Sample: ☒ WWTF Effluent
☐ Industrial Effluent
☐ Other _____

Is the sample: ☐ Prechlorinated
☒ Dechlorinated
☐ Chlorine spiked in lab
☐ Unchlorinated

Site Description: _____

Sample Collection Procedures: _____

Sample Shipment

Method of Shipment: UPS

Relinquished By: [Signature] Date: 3-27-17 Time: 11:40 AM

Received By: [Signature] Date: 3-27-17 Time: 11:40

Relinquished By: [Signature] Date: 3-27-17 Time: 1430

Received By: [Signature] Date: 3-27-17 Time: 1:30

RC [Signature] Date: 3-27-17 Time: 3:30

FOR NEB USE ONLY

Temperature of Effluent Upon Receipt at Lab: RCO [Signature] °C

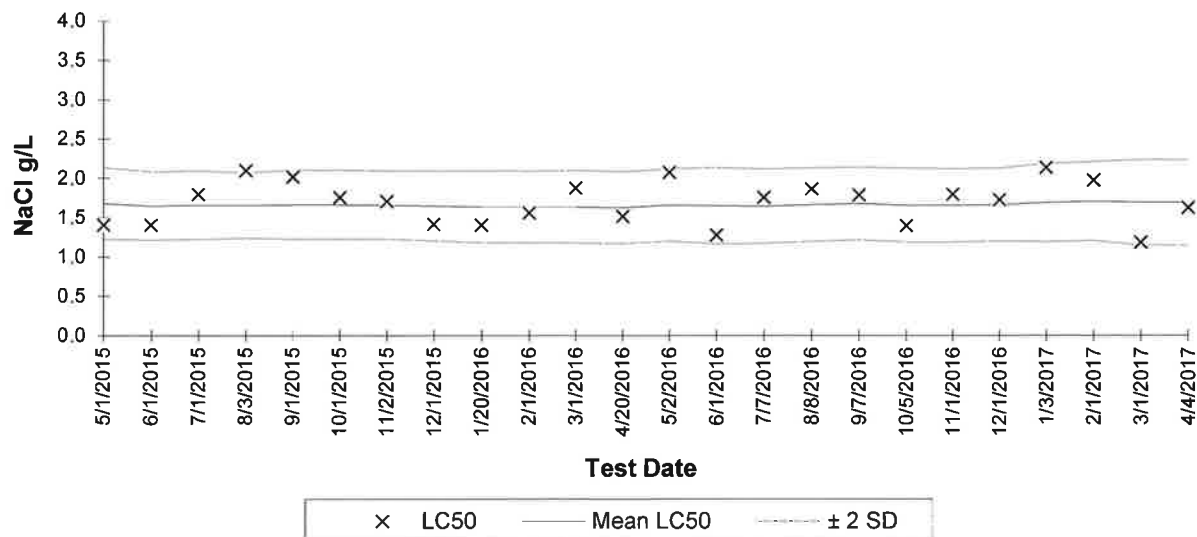
Effluent COC# _____

3-27-17 1615
received by (NEB): [Signature] 3/27/17 1615
received ON 105

IF THIS COOLER IS MISPLACED OR THE LABEL IS LOST, PLEASE SHIP TO:
KIM WILLS, NEW ENGLAND BIOASSAY, 77 BATSON DRIVE, MANCHESTER CT 06042

New England Bioassay
Reference Toxicant Data: *Ceriodaphnia dubia* 48-hour LC50

Reference Toxicant: Sodium chloride
Testing Dates: May 2015 - April 2017



Test ID	Date	LC ₅₀	Mean LC ₅₀	STD	-2 STD	+2 STD	CV	CV National	CV National
								75th %	90th %
15-545	5/1/2015	1.4	1.7	0.2	1.2	2.1	0.14	0.29	0.34
15-700	6/1/2015	1.4	1.6	0.2	1.2	2.1	0.13	0.29	0.34
15-896	7/1/2015	1.8	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1078	8/3/2015	2.1	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1293	9/1/2015	2.0	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1453	10/1/2015	1.8	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1684	11/2/2015	1.7	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1772	12/1/2015	1.4	1.6	0.2	1.2	2.1	0.13	0.29	0.34
16-107	1/20/2016	1.4	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-134	2/1/2016	1.6	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-298	3/1/2016	1.9	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-563	4/20/2016	1.5	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-592	5/2/2016	2.1	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-703	6/1/2016	1.3	1.7	0.2	1.2	2.1	0.15	0.29	0.34
16-885	7/7/2016	1.8	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-1156	8/8/2016	1.9	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1252	9/7/2016	1.8	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1466	10/5/2016	1.4	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1586	11/1/2016	1.8	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1730	12/1/2016	1.7	1.7	0.2	1.2	2.1	0.14	0.29	0.34
17-5	1/3/2017	2.1	1.7	0.2	1.2	2.2	0.15	0.29	0.34
17-147	2/1/2017	2.0	1.7	0.3	1.2	2.2	0.15	0.29	0.34
17-274	3/1/2017	1.2	1.7	0.3	1.2	2.2	0.16	0.29	0.34
17-475	4/4/2017	1.6	1.7	0.3	1.1	2.2	0.16	0.29	0.34